

Listing of Claims

The following listing of claims replaces all prior versions and listings of claims in the application.

1. (Original): A method of producing an LnCuOX single-crystal thin film, wherein Ln is at least one selected from the group consisting of lanthanide elements and yttrium, and X is at least one selected from the group consisting of S, Se and Te, said method comprising the steps of:

growing a base thin film on a single-crystal substrate;

depositing an amorphous or polycrystalline LnCuOX thin film on said base thin film to form a laminated film;

enclosing said laminated film in a closed vacuum environment, and

then annealing said laminated film at a high temperature of 500°C or more in said vacuum environment.

2. (Original): The method as defined in claim 1, wherein said base thin film is made of either one material selected from the group consisting of Cu, Cu₂S, CuS, Cu₂O, CuO, CuCl, CuCl₂, CuI, Ag, Ag₂S, Ag₂O, AgO, AgCl, AgI and Au.

3. (Original): The method as defined in claim 1, wherein said single-crystal substrate is made of either one material selected from the group consisting of YSZ, Y₂O₃, STO, Al₂O₃ and MgO.

4. (Original): The method as defined in claim 1, wherein said base thin film is a Cu thin film, and said single-crystal substrate is made of either one material selected from the group consisting of YSZ, Y₂O₃ and MgO, wherein said Cu thin film is grown on a (100) plane of said single-crystal substrate.

5. (Original): The method as defined in claim 1, wherein said annealing step is performed in an atmosphere containing LnCuOX vapor.

6. (Original): The method as defined in claim 1, which includes the step of covering the surface of said deposited amorphous or polycrystalline LnCuOX thin film by an YSZ single-crystal plate in advance of said enclosing step.

7. (Original): The method as defined in claim 1, which includes the steps of:

preparing an additional laminated film composed of said amorphous or polycrystalline LnCuOX thin film, said base thin film and said single-crystal substrate, or composed of said amorphous or polycrystalline LnCuOX thin film and said single-crystal substrate; and

attaching the respective surfaces of said additional laminated film and said laminated film formed in said depositing step together in advance of said enclosing step.

8. (Currently Amended): A single-crystal thin film ~~produced through the method as defined in either one of claims 1 to 7~~, consisting of a composition expressed by LnCuOX , wherein Ln is at least one selected from the group consisting of lanthanide elements and yttrium, and X is at least one selected from the group consisting of S, Se and Te.

9. (Original): A single-crystal thin film consisting of a composition expressed by $\text{Ln}_{1-y}\text{MyCuOX}$ which is obtained by substituting the Ln site of the composition LnCuOX of the single-crystal thin film as defined in claim 8, with a divalent ion of a metal M, wherein $0 < y < 1$, and M is at least one selected from the group consisting of Mg, Ca, Sr, Ba and Zn.

10. (Currently Amended): A method of producing a single-crystal $\text{LnCuOX}_{1-x}\text{X}'_x$ solid-solution thin film, wherein Ln is at least one selected from the group consisting of lanthanide elements and yttrium; $0 < x < 1$; and each of X and X' is at least one selected from the group consisting of S, Se and Te, wherein X and X' are different elements, said method comprising the steps of:

preparing a substrate consisting of the LnCuOX single-crystal thin film as ~~defined in claim 8~~ or the $\text{Ln}_{1-y}\text{MyCuOX}$ single-crystal thin film as ~~defined in claim 9~~;

depositing an LnCuOX' or $\text{Ln}_{1-y}\text{MyCuOX}'$ thin film on said substrate to form a laminated film;

enclosing said laminated film in a vacuum chamber, and

then annealing said laminated film at a high temperature of 500°C or more in said vacuum environment.

11. (Currently Amended): A device building block for use in either one selected from the group consisting of a light-emitting diode, a semiconductor laser, a field-effect transistor and a hetero-bipolar transistor, said device building block consisting of the LnCuOX single-crystal thin film ~~as defined in claim 8~~ or the $\text{Ln}_{1-y}\text{MyCuOX}$ single-crystal thin film ~~as defined in claim 9~~.